

182 *Mr. Birt, Indications of Rotation in a Solar Spot.*

angle of the nucleus, and by a brighter space between the nucleus and largest detached spot within the penumbra: the latter, however, might have resulted from contrast."

The observations were made with a magnifying power of 220.

On some Indications of Rotation in a Solar Spot.

By W. R. Birt, Esq.

Finding that a somewhat large spot had entered on the visible hemisphere of the sun on February 22, I availed myself of Mr. Slater's kindness, and obtained two views, one shortly before its passage of the centre, and one exactly three days after the first. The two drawings accompanying this communication indicate the nature and extent of the changes that occurred during the three days.* Power employed, 220; aperture, 15 inches, reduced to 4 inches for subduing the light.

Sketch No. 1	February 28	$2^{\text{h}} 30^{\text{m}}$ to $4^{\text{h}} 0^{\text{m}}$	G.M.T.
Sketch No. 2	March 3	$2^{\text{h}} 45^{\text{m}}$ to $3^{\text{h}} 45^{\text{m}}$	G.M.T.

The two sketches are strictly comparable, having been executed about the same time of the day.

Nuclei.—The nuclei of the two principal spots in the group presented a more or less uniform appearance. I did not remark the peculiar *striated* appearance so distinctly apparent in the spot of the 23d of February, an account of which I communicated to the Society. It will be seen from the drawings that the nuclei of both spots underwent external configuration of form.

Penumbra.—The radiated appearance of the penumbra, as seen in the spot of February 23, was not detected in the penumbra of the two principal spots of this group. In Sketch No. 1, Feb. 28, three well-marked luminous patches were discernible near the left-hand upper edge of the penumbra (as seen in the telescope); also an intense luminous space between the principal nucleus and the smaller one in the largest spot.

On taking the second sketch, the penumbra around the two nuclei of the large spot appeared to be quite uniform in its luminosity; the smaller nucleus had increased considerably in size, and the intense luminous space between it and the principal nucleus had increased in brilliancy. It appeared to me that between the two nuclei the penumbra, properly so called, was absent; or this increase of brilliancy might have resulted from contrast.

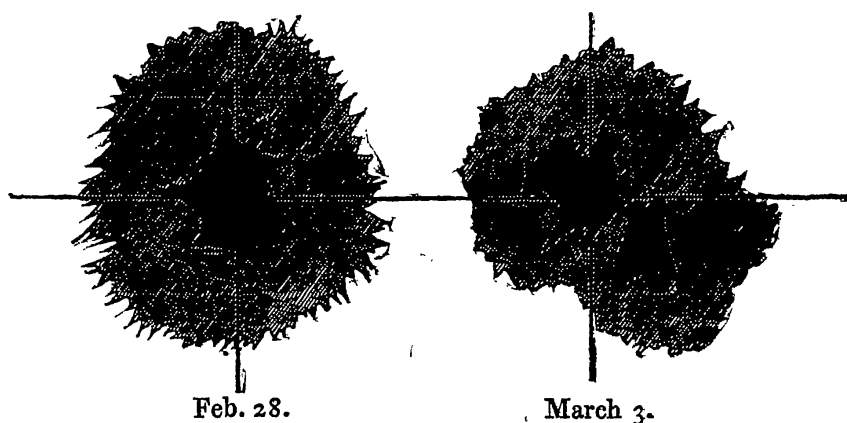
The penumbra of the smaller spot underwent, in the three days, a marked change of form; the direction of the longer

* These drawings were exhibited at the meeting of the Society.

diameter, on the 3d March, was nearly at right angles to its direction on the 28th February. The change of form of the nucleus during the same interval is considerable; it is, however, possible, by means of the angular points, to determine somewhat of the nature of the change of shape; and if we take the principal projecting point to the left, in Sketch No. 1, to be the same as the principal projecting point on the upper part of the nucleus in Sketch No. 2, then we have a somewhat similar disposition of the penumbra in both sketches, from which it would result that during the interval this spot had shifted its position about a quarter of a rotation.

The smaller Spots.—Numerous changes appear to have taken place among the smaller spots in the neighbourhood. Most of the spots below the large one, on Sketch No. 1, had disappeared on March 3. A small triangle only was visible, and it is somewhat difficult to ascertain if the spots forming it, and seen on March 3, were any of the smaller spots seen on February 28. While these spots had mostly disappeared, a somewhat considerable chain of small spots had formed below the smallest of the principal spots, and in the line of prolongation of the two principal spots. The nearly rectilinear division of the penumbra of the smallest of these is interesting; the same kind of arrangement was detected on Feb. 28.

Indications of Rotation of the largest Spot.—In order to exhibit in the clearest light the indications, afforded by the



two sketches, of rotation in the largest spot, I have placed views of them in juxtaposition. The change in the direction of the longer diameter of the penumbra, the alteration of place of the principal angular point of the larger nucleus, the new locality of the secondary nucleus, and other interesting features, bear testimony to a change of position of the spot itself apparently of the nature of rotation. This mode, however, of dealing with the subject may not be quite satisfactory. The spot itself has advanced considerably on the sun's disk in the interval between the sketches. It will therefore be important to compare the positions of the principal points of the largest spot with those of the spots surrounding it. A glance at the two sketches will

at once show that the longest diameter of the largest spot occupied two different directions, on the two days, with regard to the smallest of the two principal spots; in point of fact, that the largest spot had so moved in the interim as to bring its longest diameter into a line with the smallest spot, this having apparently changed its position by an independent rotation of its own.

The variations among the smaller spots appear to have been so rapid as to preclude the detection of any rotation among them.

March 4, 1859.

Note on Saturn's Ring. By the Rev. W. R. Dawes.

In the *Monthly Notices* for January last are some remarks by Captain Noble on the appearance of *Saturn's* obscure ring as seen with his excellent 4.2-inch refractor. He describes it as seeming to *dip* under ring B; "having never been able satisfactorily to trace the junction of those portions of it in the ansæ with the part crossing the ball." This seems obviously to arise from the want of more illuminating power than an object-glass of only four and a quarter inches aperture can afford, however perfect its defining power may be. I have on several fine nights during the present apparition of the planet been able, with the $7\frac{1}{4}$ -inch refractor I now have in use, to trace the perfect elliptic outline of the inner edge of the ring C in the ansæ and across the ball, without the slightest break or irregularity: but with a telescope of considerably less illuminating power (only as 1 to 3), the narrow portion of it which is inclosed, as it were, between the ball and the ring B might very probably be overpowered by the incomparably brighter objects in contact with it on each side.

With reference to the curvature of the shadow of the ring on the ball, it may be remarked that when the altitude of the sun above the plane of the ring considerably exceeds that of the earth, the shadow of the ring on the ball is curved in the opposite direction to the edge of the ring, and especially near the edges of the ball. This is most remarkable when the minor axis of the outer ring is not much less than the polar diameter of the ball. The edge of the shadow then falling near the pole the visible curvature is very considerable; but I have never seen it greater on one side of the ball than on the other. The circumstances existing during the earlier part of the present apparition were particularly favourable for the display of this phenomenon, the sun's elevation exceeding that of the earth by considerably more than two degrees, and the edge of the outer ring being only about three seconds from the northern edge of